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SUPPORTING HYDROCARBON EXPLORATION IN NEW VENTURE AREAS WITH OPTICAL REMOTE SENSING

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ABSTRACT

In past time, exploration geologists mainly used Earth Observation systems for basin-wide analysis of gravimetry, magnetomerty, structural faults, lithology and land-cover. After two decades of research, nowadays multispectral and hyperspectral remote sensing represent a cutting-edge technology in the oil and gas industry. The application fields of optical remote sensing not only range from the monitoring of the oilfields to the evaluation of pollution, but also to hydrocarbon exploration. With reference to exploration activities, the observation of the territory from above into several different wavelengths is able to supply inestimable geophysical information related to the microseepage effect, different and complementary to tradition geophysical methods.

It is almost accepted that many of the oil and gas fields leak light hydrocarbon gases along nearly vertical pathways and, thus, their detection with multi/hyperspectral imaging can support the detection of active petroleum systems. Indeed, several independent oil companies are using satellite and airborne observations for reducing exploration risks in new venture areas and for optimizing their seismic surveys.

This study shows some examples of microseepage-related geochemical and geobotanical alterations detected in several different environments, from sandy desert to vegetated savannah, both using airborne hyperspectral data and multispectral satellite time series. All the examples analyze real onshore concession blocks in Africa and Asia and results clearly show a correlation between the spectral signals recorded form remote with in situ measures, well logs, the knowledge of the subsurface and the position of known oilfields.